iVu4 & iVu9

Standalone Video **Wall Controller**

Video Wall Controller
Supports 2x2 and 3x3 LCD Panel Array

User Manual

U.K Head Office & Sales Center

Electronic Modular Solutions Ltd.
Kendal House, 20 Blaby Rd., S. Wigston, Leics., LE18 4SB, England
Tel: +44 (0)116 2775730, Fax: +44 (0)116 2774973

email: sales@ems-imaging.com
Web: http://www.ems-imaging.com

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Revision

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Manual Conventions

WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**,” both capitalized and bold and is followed by text. The text is the warning message. A warning message is shown below:

WARNING:

This is an example of a warning message. Failure to adhere to warning messages may result in permanent damage to the iVu4/9 or personal injury to the user. Please take warning messages seriously.

CAUTION!

Cautionary messages should also be heeded to help reduce the chance of losing data or damaging the iVu4/9. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed. The text is the cautionary message. A caution message is shown below:

CAUTION:

This is an example of a caution message. Failure to adhere to cautions messages may result in permanent damage to the iVu4/9. Please take caution messages seriously.

NOTE:

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes. Notes are easy to recognize. The word “note” is written as “**NOTE**,” both capitalized and bold and is followed by text. The text is the cautionary message. A note message is shown below:

NOTE:

This is an example of a note message. Notes should always be read. Notes contain critical information about the iVu4/9. Please take note messages seriously.

Packing List

NOTE:

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the EMS reseller or vendor you purchased the iVu4/9 from or contact an EMS sales representative directly. To contact an EMS sales representative, please send an email to sales@ems-imaging.com

The items listed below should all be included in the iVu4/9 package.

- 1 x iVu4/9
- 1 x Power cord
- 1 x Power adapter
- 1 x Remote control
- 1 x RS-232 cable
- 1 x DVI-I dual link cable
- 1 x User manual and utilities CD
- 2 x Mount bracket
- 1 x Screw set

Images of the above items are shown in **Chapter 3**.

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Chapter

1

Introduction

1.1 Introduction

Figure 1-1: iVu4/9 Standalone

The EMS iVu4/9 video wall controller box is for displaying a single video input on an array of monitors, implementing a large display without the inherent high costs of a single large monitor. The EMS iVu4/9 is for large displays where high definition video output is also essential. The video wall controller accepts a single DVI input. The EMS iVu4/9 requires a high-resolution digital video input signal, which is split directly over the panels in the array, with no image scaling or adjustment, ensuring maximum image accuracy. The EMS iVu4/9 video controller box can be controlled remotely using the included remote control or from a computer with an RS-232 serial port.

1.2 Benefits

The benefits of the iVu4/9 include:

- Accurate, high-definition image
- Silent operation
- Simple setup
- Cheaply implements a large display

1.3 Features

The features of the iVu4/9 include:

- DVI video input
- Four/nine DVI video outputs
- Support for up to 1920 x 1200 output resolution
- Multiple video output combinations including full video wall mode, clone mode and vertical replication mode
- Bezel control compensates for gaps between monitors

1.4 External Interfaces, Switches and LEDs

External interfaces, switches and LEDs are accessed through the iVu4/9 video wall controller chassis include:

- 4 x DVI outputs (9 for iVu9)
- 1 x DVI input
- 4 x DVI output LED indicators (9 for iVu9)
- 1 x OSD menu keypad
- 1 x Power input
- 1 x Power LED indicator
- 1 x RS-232 serial communications port
- 1 x Sync in
- 1 x Sync out
- 1 x Video in LED indicator

Figure 1-2 and Figure 1-3 show the buttons and LED indicators on the front panel.

Figure 1-2: iVu4 Overview (Front View)

Figure 1-3: iVu9 Overview (Front View)

Figure 1-4 and Figure 1-5 show the external peripheral interface connectors on the rear panel.

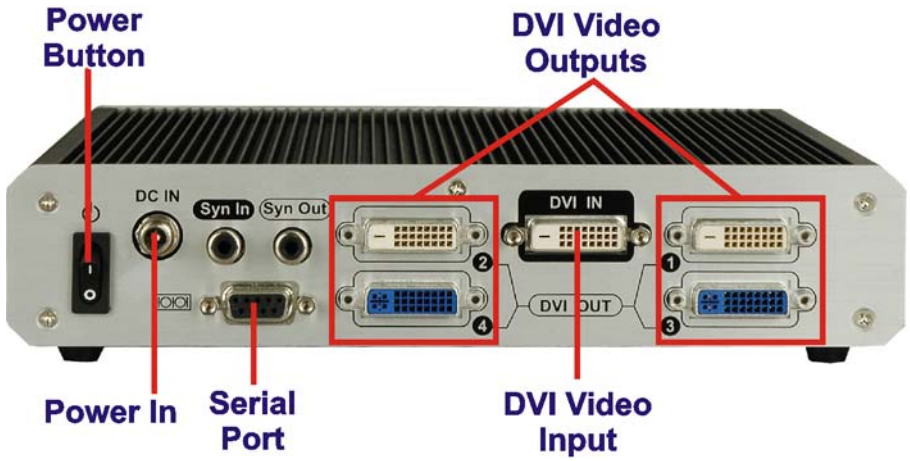


Figure 1-4: Overview (Rear View)

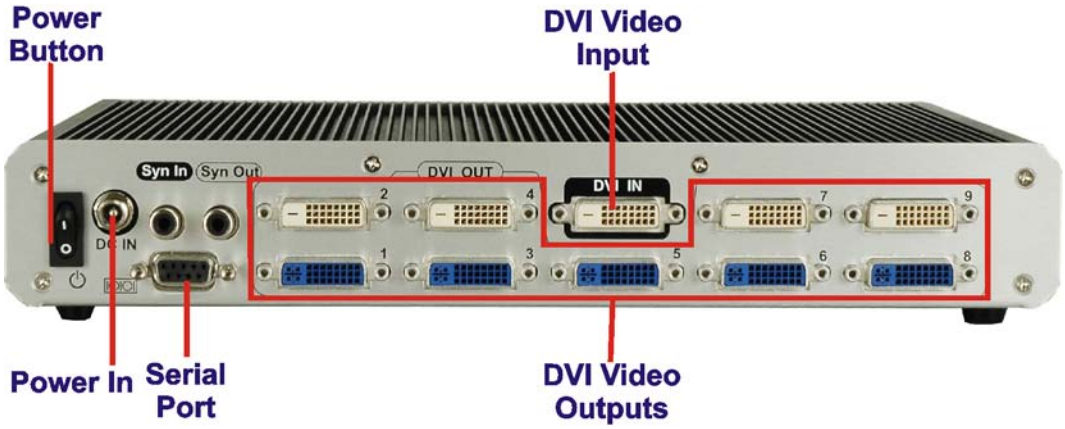


Figure 1-5: Overview (Rear View)

1.5 Technical Specifications

iVu4/9 video box features are listed in **Table 1-1**. See **Chapter 2** for details.

Specification	Detail
Model Name	iVu4/9
Main Features	1. Multiple viewing modes 2. Software OSD 3. Remote control 4. Bezel masking
Inputs	DVI
Outputs	**iVu4** – 4 x DVI iVu9 – 9 x DVI
Dimensions (H x W x D)	**iVu4** – 47 mm x 230 mm x 178 mm iVu9 – 47 mm x 295 mm x 188 mm
Cooling	Fanless
Input Resolution	1920x1080, 1920x1200, 2048x768, 2560x1024, 3840x1080, 3840x1200, 2048x1536, 2560x2048, 3840x2160, 3840x2400
Output Resolution	1024x768, 1280x1024, 1920x1080, 1920x1200
Power Adapter Input	90 VAC to 264 VAC / 47 Hz to 63 Hz

Specification	Detail
Power Adapter Output	12 V DC
Safety and Emission	CCC, CE, FCC
Temperature	0ºC – 40ºC
Power Consumption	**iVu4** – 10 W iVu9 – 17 W

Table 1-1: Technical Specifications

Chapter

2

System Overview

2.1 Dimensions

The dimensions of the iVu4/9 are listed in the sections below.

2.1.1 iVu4 Dimensions

- **Height**: 47 mm
- **Width**: 230 mm
- **Depth**: 178 mm

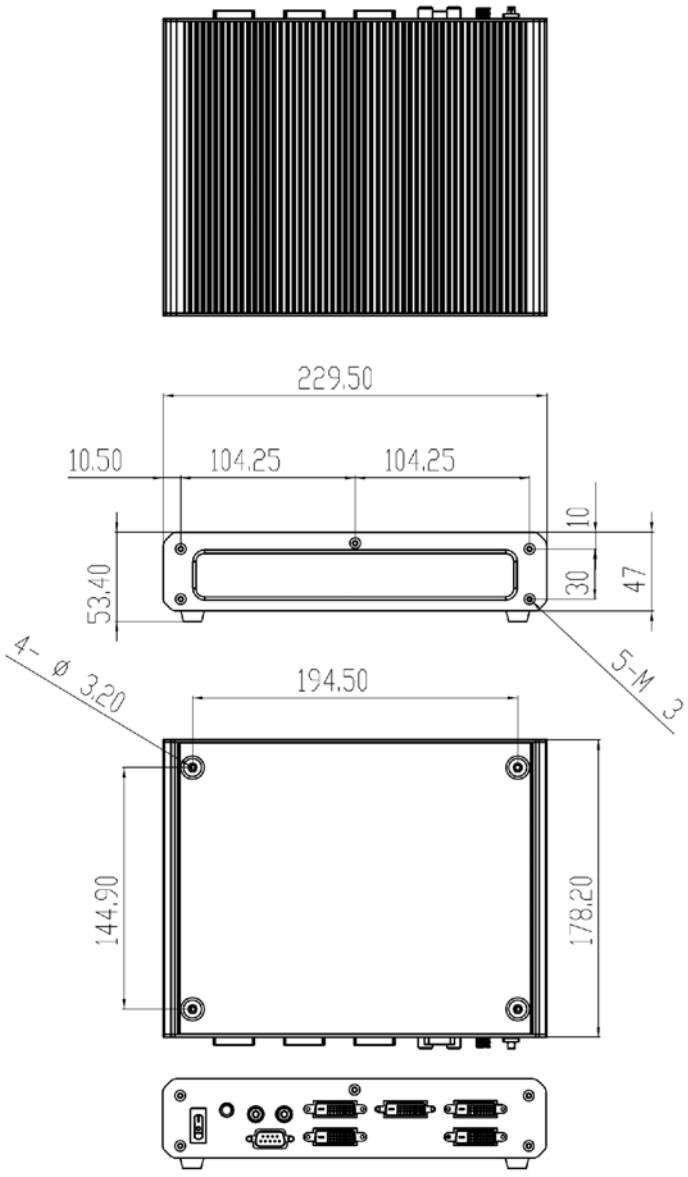


Figure 2-1: iVu4 Video Box Dimensions

2.1.2 iVu9 Dimensions

- **Height**: 47 mm
- **Width**: 295 mm
- **Depth**: 188 mm

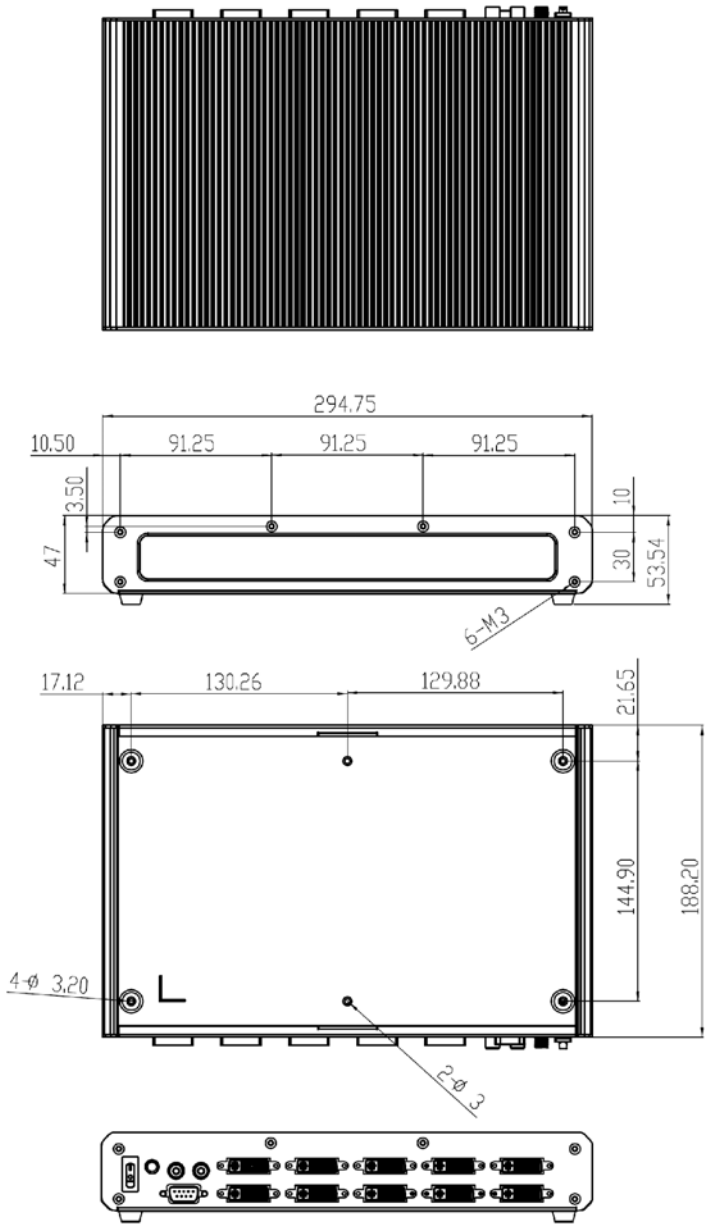


Figure 2-2: iVu9 Video Box Dimensions

2.2 External Overview

This section gives and overview of the connectors, switches and indicators on the iVu4/9.

2.2.1 Front Panel

The front panel has the following buttons and indicators (shown in Figure 2-3 and Figure 2-4 below):

- Power indicator LED
- Video output LEDs
- Video input LED
- OSD menu keypad

Figure 2-3: iVu4 Front Panel

Figure 2-4: iVu9 Front Panel

2.2.2 Rear Panel

The rear panel has the following connectors, switches and indicators (shown in Figure 2-5 and Figure 2-6 below):

- 4 x DVI video outputs (9 on the iVu9)
- 1 x DVI video input
- 1 x Power input
- 1 x Power switch
- 1 x RS-232 serial communications port
- 1x Sync in
- 1 x Sync out

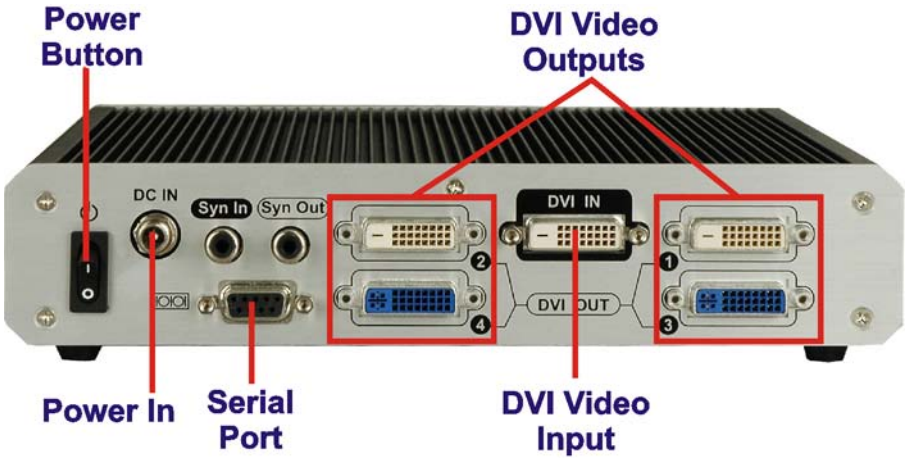


Figure 2-5: iVu4 Rear Panel

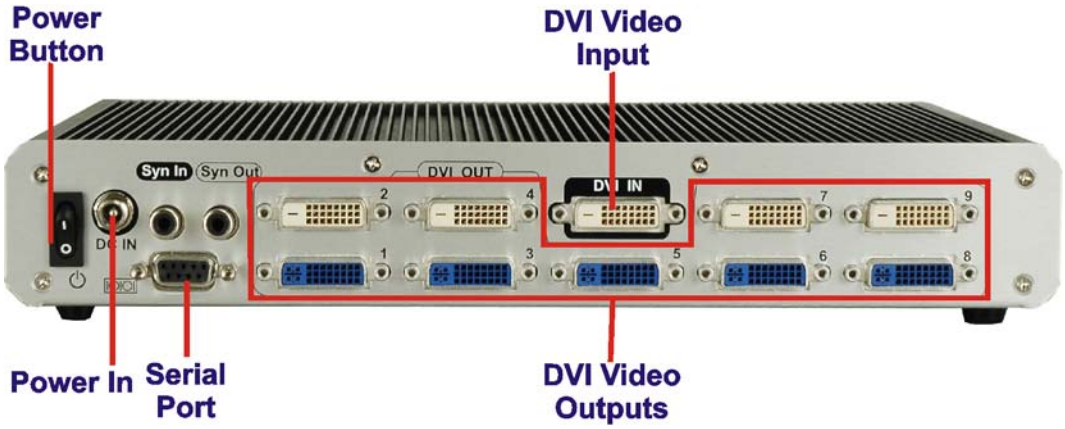


Figure 2-6: iVu9 Rear Panel

2.2.2.1 DVI Connector

CN Label:	**DVI1**
CN Type:	DVI connector
CN Location	See Figure 2-5
CN Pinouts:	See Table 2-1

The 24-pin Digital Visual Interface (DVI) connector connects to high-speed, high-resolution digital displays. The DVI-I connector supports both digital and analog signals.

PIN	Signal Name	Pin #	Signal Name	Pin #	Signal Name
1	TMDS Data2-	9	TMDS Data1-	17	TMDS Data0-
2	TMDS Data2+	10	TMDS Data1+	18	TMDS Data0+
3	GND	11	GND	19	GND
4	N/C	12	NC	20	NC
5	N/C	13	NC	21	NC
6	DDC Clock [SCL]	14	PVDD1	22	GND
7	DDC Data [SDA]	15	GND	23	TMDS Clock +
8	Analog vertical sync	16	GND	24	TMDS Clock -
C1	Analog Red				
C2	Analog Green				
C3	Analog Blue				
C4	Analog Horizontal Sync				
C5	Analog GND				

Table 2-1: DVI Connector Pinouts

2.2.2.2 Serial Port

CN Label: **COM1**

CN Type: RS-232 serial connector

CN Location: See Figure 2-5

CN Pinouts: See Table 2-2 and Figure 2-7

The RS-232 serial connector provides serial connections in RS-232 mode.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DCD1	2	DSR1
3	RX1	4	RTS1
5	TX1	6	CTS1
7	DTR1	8	RI1
9	GND		

Table 2-2: COM1 Pinouts

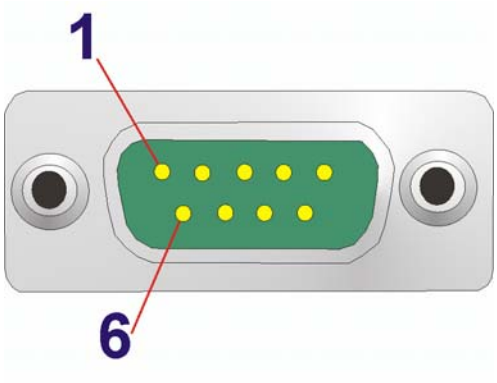


Figure 2-7: COM1 Pinout Locations

Chapter

3

Unpacking List

3.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the iVu4/9 may result in permanent damage to the iVu4/9 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the iVu4/9. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the iVu4/9, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***:- Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: - When configuring the iVu4/9, place it on an antic-static pad. This reduces the possibility of ESD damaging the iVu4/9.
- ***Only handle the edges of the PCB***:- When handling the PCB, hold the PCB by the edges.

3.2 Unpacking Precautions

When the iVu4/9 is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 3.1**.
- Make sure the packing box is facing upwards so the iVu4/9 does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

3.3 Packing List

NOTE:

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the EMS reseller or vendor that sold the iVu4 / 9 from or contact an EMS sales representative directly. To contact an EMS sales representative, please send an email to sales@ems-imaging.com

The iVu4/9 is shipped with the following components:

No.	Description	Image
1	iVu4/9	
1	Power cord	
1	Power adapter	
1	Remote control	
1	Mounting brackets	
1	Screw kit	
1	User manual and utilities CD	

No.	Description	Image
2	RS-232 cable	
1	DVI cable	

Table 3-1: Package List Contents

3.4 Optional Items

The following optional items are available for the iVu4/9:

Description	Image
DVI cable	

Table 3-2: Optional Items

Chapter

4

Installation

4.1 Installation Overview

The iVu4 supports a 4-panel setup and the iVu9 supports a 9-panel setup.

4.1.1 Four Panel Overview

The implementation of a 4-panel array is shown in Figure 4-1 below.

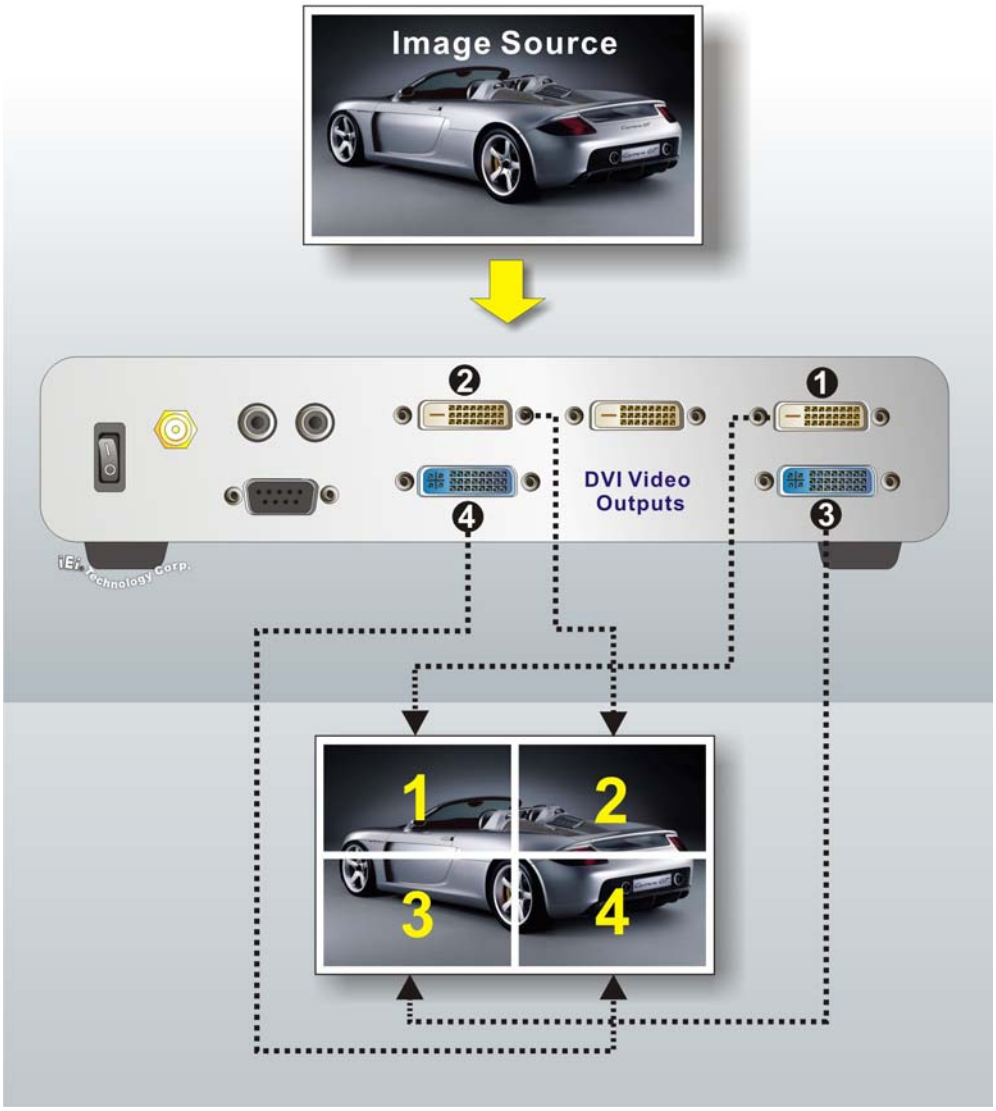


Figure 4-1: Four Panel Setup

4.1.2 16 Panel Overview

The implementation of a 9-panel array is shown in Figure 4-2 below.

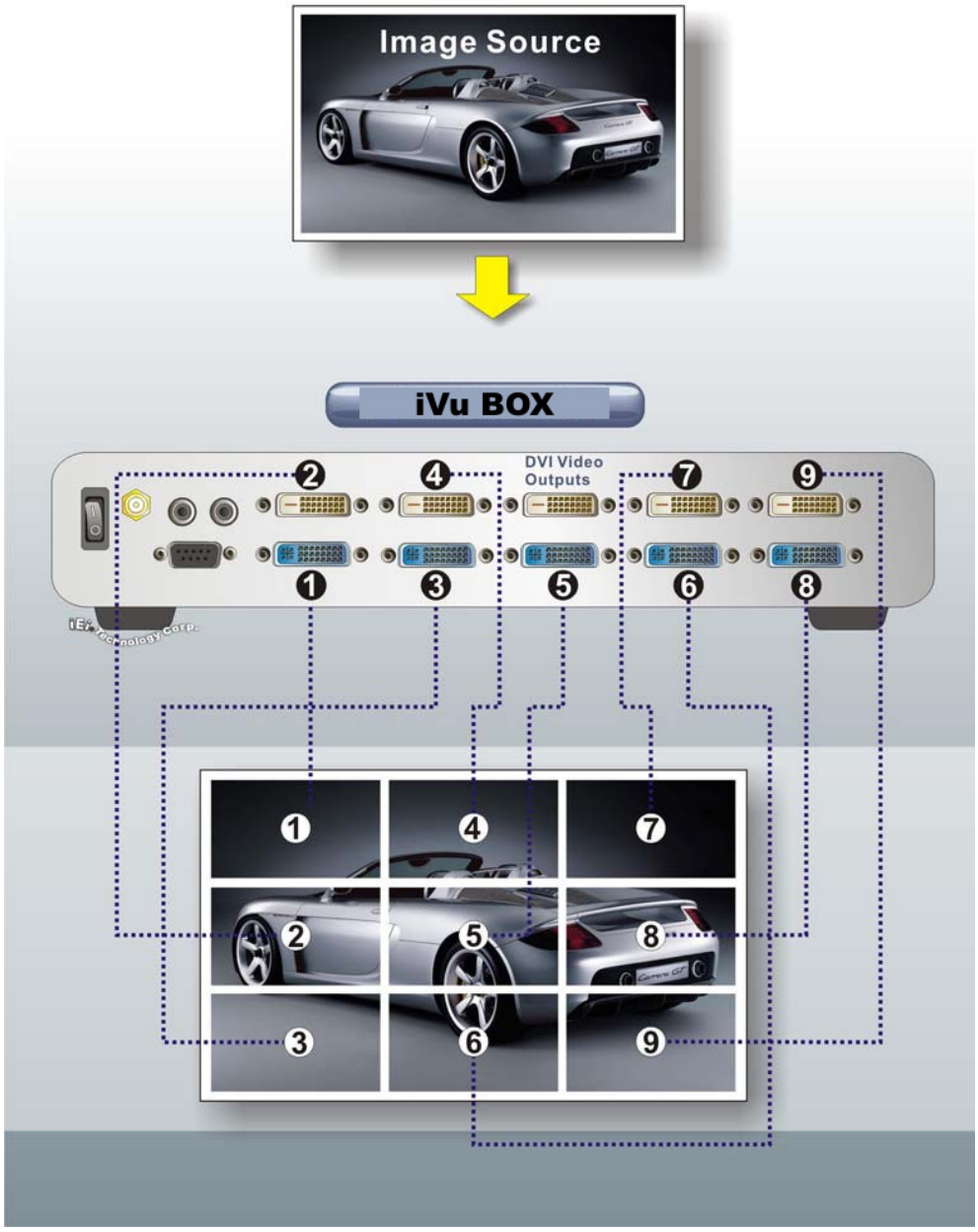


Figure 4-2: 9 Panel Setup

4.2 Installation Steps

To install the iVu4/9 please follow the installation steps below:

Step 1: Install the LCD panels.

Step 2: Mount the iVu4/9.

Step 3: Connect DVI cables, video input cable, RS-232 cable and power adapter to the iVu4/9.

Step 4: Adjust the screen resolution output settings.

Step 5: Adjust the iVu4/9 bezel settings to align the images.

4.3 Install LCD Panels

The LCD panels are installed as a square array, with two rows and two columns for the iVu4 and three rows and three columns for the iVu9.

Recommended installation procedures are to

- Use all identical monitors
- Minimize gaps between panels for the best image
- Maintain consistent horizontal gaps between monitors
- Maintain consistent vertical gaps between monitors

4.4 Mounting

The iVu4/9 must be placed on a table, desk or other firm surface. Optionally, the iVu4/9 can be mounted using the included mounting brackets. The installation location must be:

- Out of direct sunlight
- Without anything on top of it
- On a firm surface
- Away from moisture and liquids

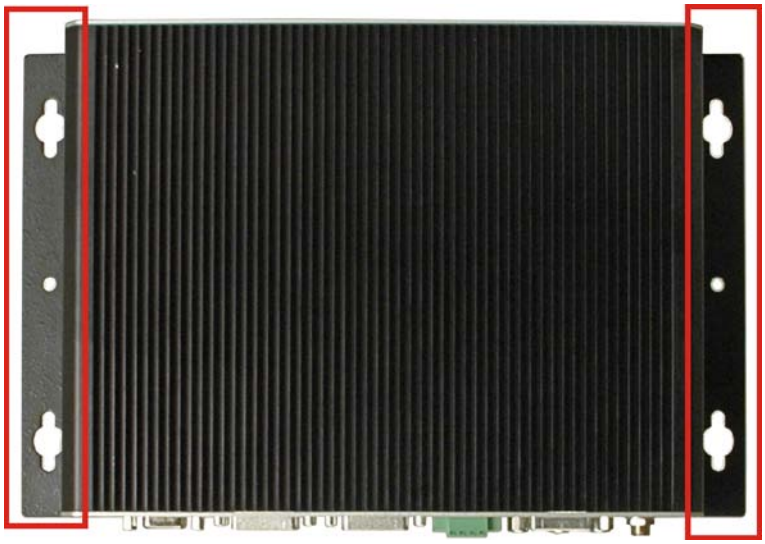


Figure 4-3: Mounting Brackets

4.5 Connect Cables

The cables that need to be attached to the iVu4 are listed below and their connections are shown in Figure 4-4 (connections for the iVu9 are similar):

- **Video input cable** – from a DVI video source
- **Video output cables** – attached to the LCD panels or another iVu4/9. Make sure the cables are connected to the correct monitors as shown in Figure 4-4.
- **Power cable** – from the power adapter
- **RS-232 cable** (optional) – connected to a computer with smartOSD software installed

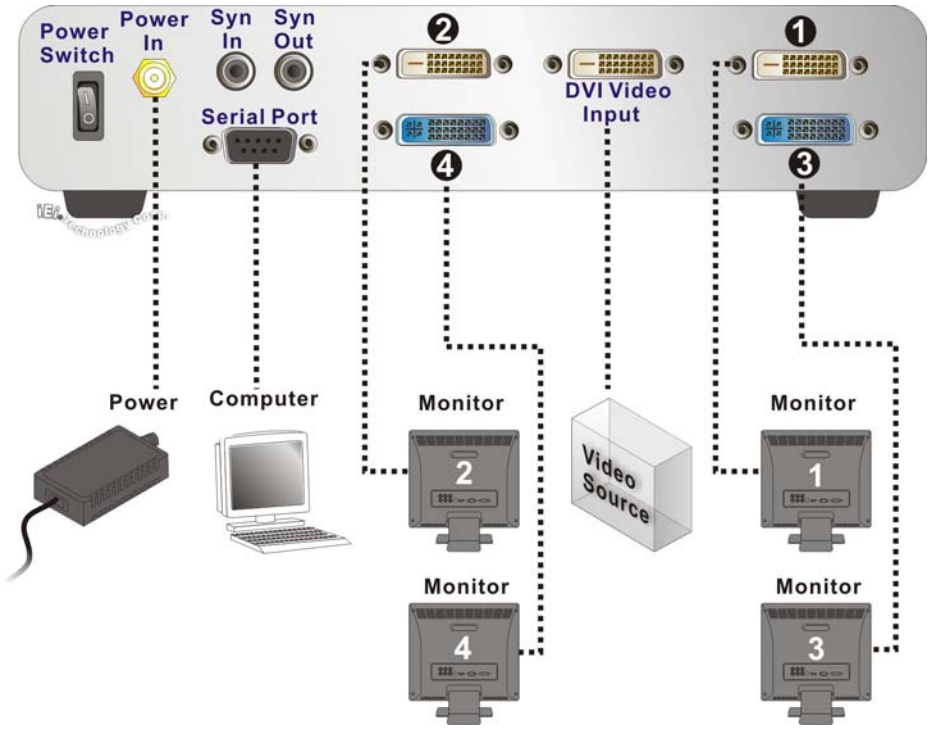


Figure 4-4: Cable Connections

4.5.1 Connect the Video Source and iVu4/9

Connect the video source to the iVu4/9. If the video source is a computer with the smartOSD software installed, that computer can be used to adjust the monitor settings without using the OSD.

The video source connects directly to the iVu4/9 through a DVI cable.

To connect the video source to the iVu4/9, follow the steps below.

Step 1: Attach the DVI cable to the video source.

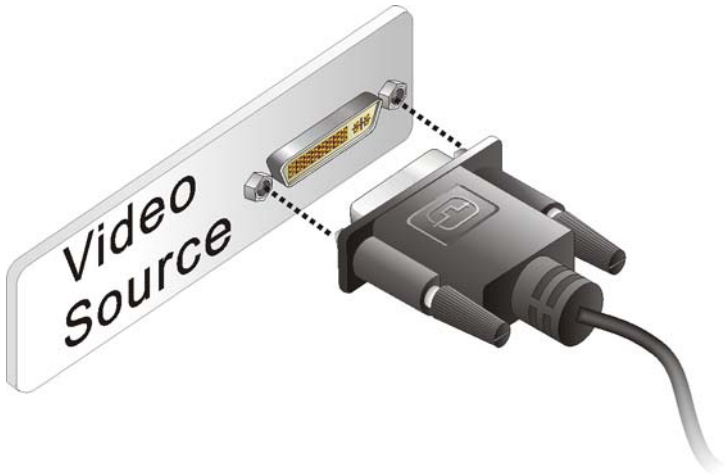


Figure 4-5: Video Source

Step 2: Attach the video cable to the iVu4/9.

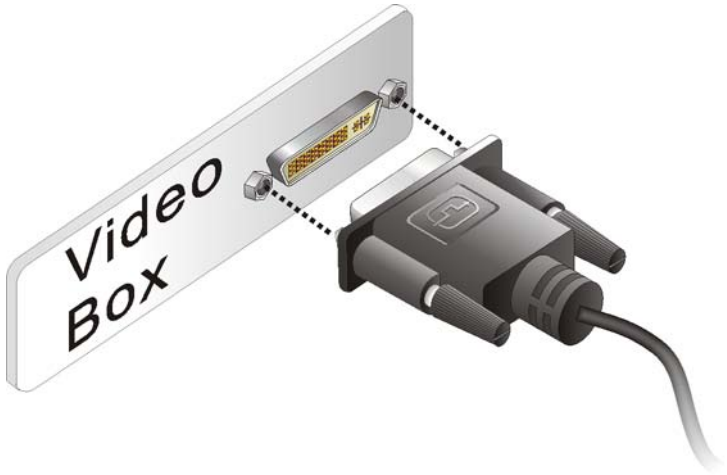


Figure 4-6: iVu4/9 Video Input

4.5.2 Connect the RS-232 Cable to the iVu4/9 (Optional)

The iVu4/9 has a male DB-9 connector on the rear panel. The RS-232 cable connects to a computer that has the smartOSD software installed. This enables the computer to control the screen setup. This computer does not need to be the video source. If the video source is from a PC the image screen setup can be controlled through

the DVI or VGA cable. Follow the steps below to connect a serial device to the iVu4/9.

Step 1: **Locate the DB-9 connector**. The location of the DB-9 connector is shown in **Chapter 2**.

Step 2: **Insert the serial connector**. Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See Figure 4-7.

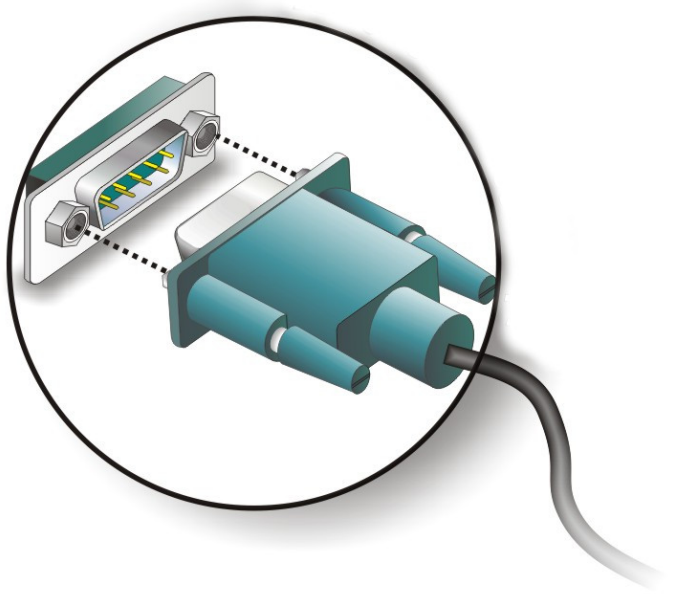


Figure 4-7: Serial Device Connector

Step 3: Secure the connector. Secure the serial device connector to the external interface by tightening the two retention screws on either side of the connector.

4.5.3 Connect the iVu4/9 to the Power Supply

Connect the included PSU into an AC power supply then connect the PSU to the iVu4/9. The figure below shows the typical setup. There is no power switch, and the iVu4/9 turns on as soon as it is connected to the PSU.

4.6 Resolution and Display Mode

The iVu4/9 display mode is automatically selected according to the input resolution. The display modes are shown in Figure 4-8 and the input resolution settings are shown in Table 4-1.

Figure 4-8: Display Mode

Input Resolution	Mode	Video Output Resolution
1920x1080@60 Hz	Clone – same image on all monitors	1920x1080@50 Hz
1920x1200@60 Hz		1920x1200@50 Hz
2048x768@60 Hz	Split – same image shows on each row or monitors	1024x768@60 Hz
2560x1024@60 Hz		1280x1024@60 Hz
3840x1080@40 Hz		1920x1080@50 Hz
3840x1200@40 Hz		1920x1200@50 Hz
2048x1536@58 Hz	Video wall – image split over all monitors	1024x768@60 Hz
2560x2048@50 Hz		1280x1024@60 Hz
3840x2160@24 Hz		1920x1080@50 Hz
3840x2400@25 Hz		1920x1200@50 Hz

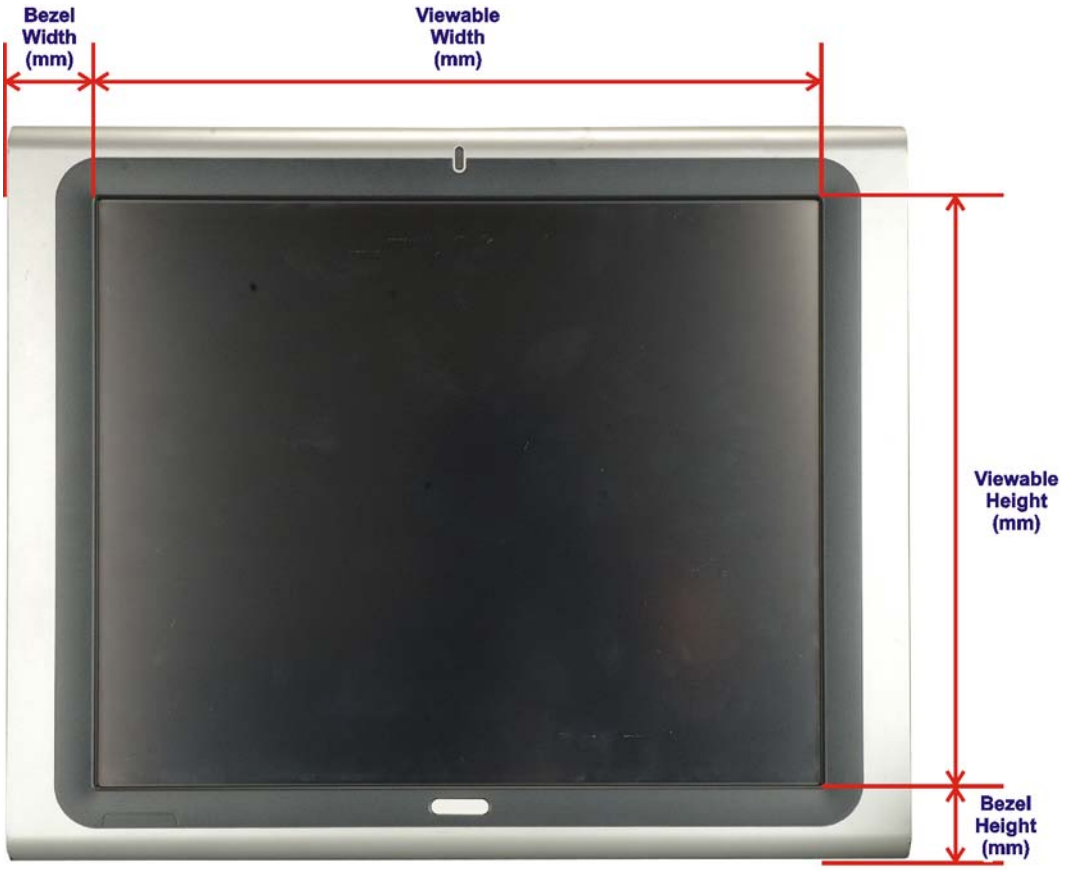
Table 4-1: Input and Output Resolution

4.7 Bezel Compensation

The bezel compensation setting compensates for the gaps between monitors in the video wall array. The bezel compensation sizes the image slightly larger than the visible screen

to make the images on adjacent monitors line-up correctly. The bezel settings can be set using the smartOSD (Section 5.1) or OSD menu (Section 5.2).

To calculate the appropriate mask value, use the formula shown in Figure 4-9 below:



$$\text{Value of X} = \frac{\text{Bezel Width (mm)}}{\text{Viewable Width (mm)}} \times \frac{\text{Viewable Width (pixels)}}{4}$$

$$\text{Value of Y} = \frac{\text{Bezel Height (mm)}}{\text{Viewable Height (mm)}} \times \frac{\text{Viewable Height (pixels)}}{4}$$

Figure 4-9: Mask Calculation

Chapter

5

OSD Functions

5.1 smartOSD

EMS smartOSD is a proprietary On-Screen-Display (OSD) software solution from EMS that enables easy, remote monitor setting adjustments in a Windows environment. EMS smartOSD delivers excellent performance and provides more flexibility than the typical OSD hardware solutions when adjusting a monitor. smartOSD also allows the screen output screen resolution and mask size to be adjusted over a DVI cable.

5.1.1 Pre-installation Notice

Before installing smartOSD software, please make sure one of the following operating systems is installed:

- Windows 95
- Windows NT 4.0
- Windows 98
- Windows 2000
- Windows 2003
- Windows XP
- Windows Vista

5.1.2 Installing the smartOSD

To install the software, please follow the steps below:

Step 1: Follow the instructions from the interactive installer to install the EMS smartOSD on the system.

Step 2: Insert the installation disk that came with the system and open the installation file.

Step 3: The language selection window appears (Figure 5-1).

Figure 5-1: smartOSD Language Selection

Step 4: Select the preferred language then click **OK**.

Step 5: The welcome screen shown below appears (Figure 5-2).

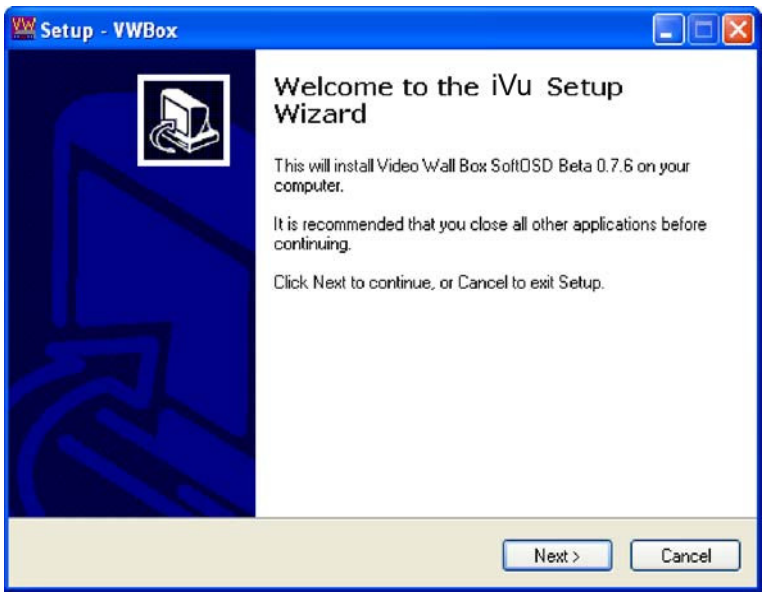

Setup - VWBox
Welcome to the iVu Setup Wizard
This will install Video Wall Box SoftOSD Beta 0.7.6 on your computer.
It is recommended that you close all other applications before continuing.
Click Next to continue, or Cancel to exit Setup.
Next >
Cancel

Figure 5-2: smartOSD Welcome Screen

Step 6: Click **NEXT** to continue.

Step 7: The **Select Destination Folder** window appears (Figure 5-3).

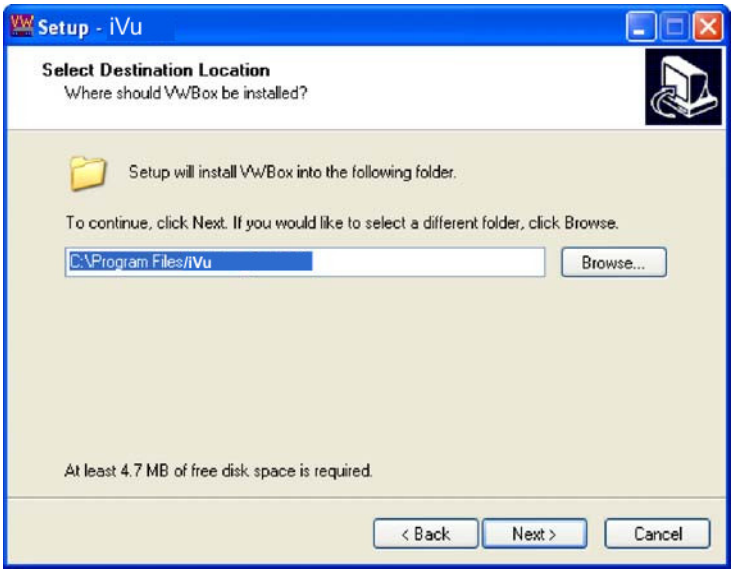

Setup - iVu
Select Destination Location
Where should VWBox be installed?
Setup will install VWBox into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\iVu
Browse...
At least 4.7 MB of free disk space is required.
< Back
Next >
Cancel

Figure 5-3: smartOSD Installation Directory

Step 8: Change the installation directory if necessary. Click **NEXT** to continue.

Step 9: The **Select Start Menu Folder** option window appears (Figure 5-4).

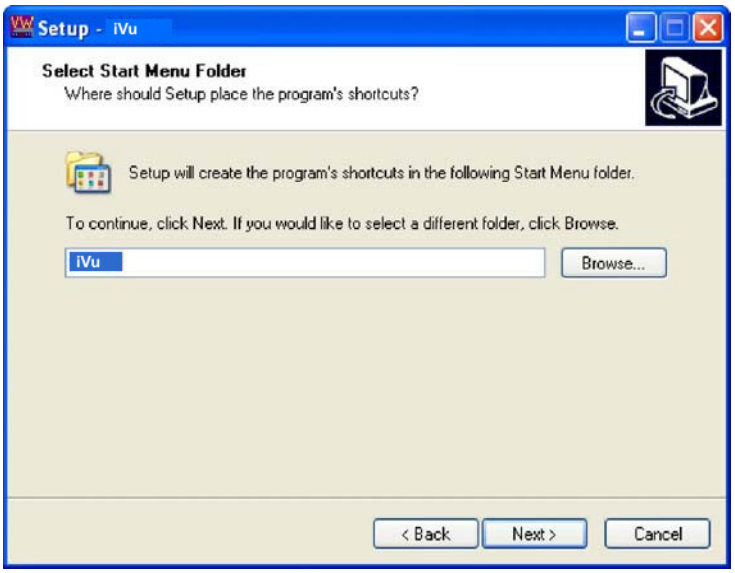

Setup - iVu
Select Start Menu Folder
Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.
iVu
Browse...
< Back
Next >
Cancel

Figure 5-4: smartOSD Start Menu Folder

Step 10: Choose a new name or folder for the Start Menu entry if necessary. Click **NEXT** to continue.

Step 11: The **Additional Tasks** window appears (Figure 5-5).

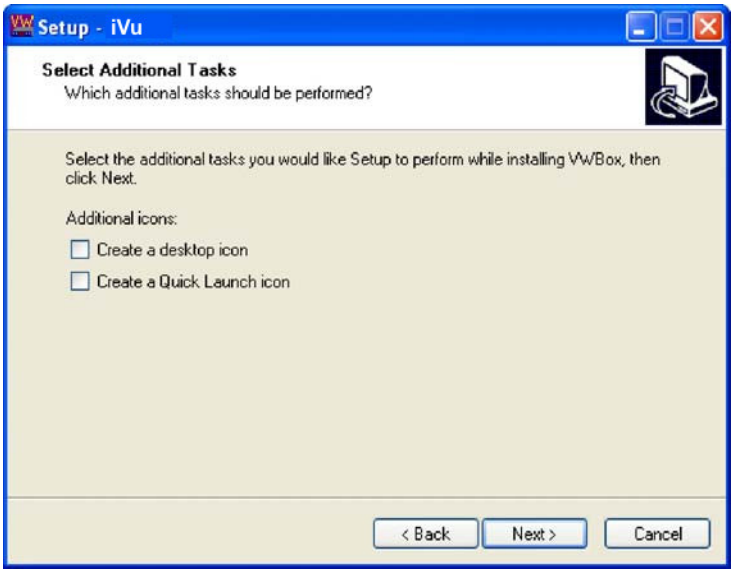

Setup - iVu
Select Additional Tasks
Which additional tasks should be performed?
Select the additional tasks you would like Setup to perform while installing VWBox, then click Next.
Additional icons:
Create a desktop icon
Create a Quick Launch icon
< Back
Next >
Cancel

Figure 5-5: smartOSD Additional Tasks

Step 12: Check the extra items that should be added (optional). Click NEXT to continue.

Step 13: The **Ready to Install** windows appears (Figure 5-6).

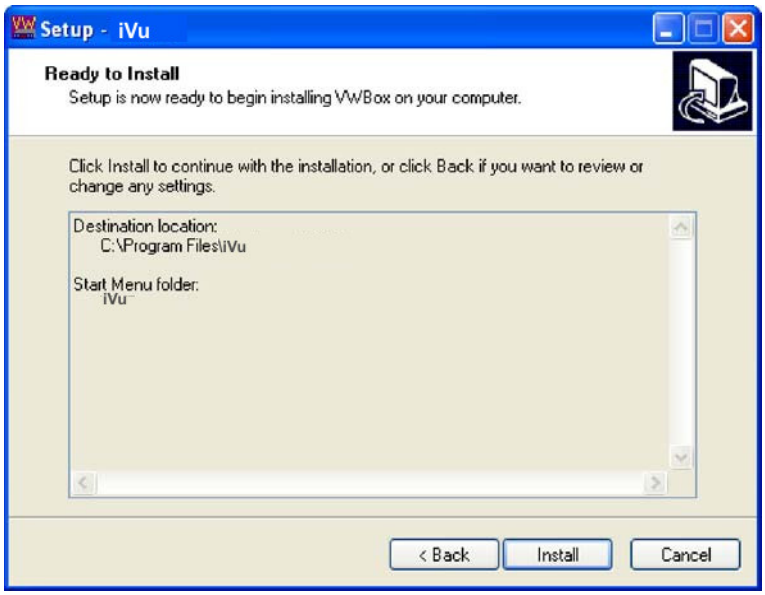

Setup - iVu
Ready to Install
Setup is now ready to begin installing VWBox on your computer.
Click Install to continue with the installation, or click Back if you want to review or change any settings.
Destination location:
C:\Program Files\iVu
Start Menu folder:
iVu
< Back
Install
Cancel

Figure 5-6: smartOSD Ready to Install

Step 14: Confirm the installation by clicking INSTALL in the screen above.

Step 15: The **Installation Progress** window appears, showing the progress of the software installation (Figure 5-7).

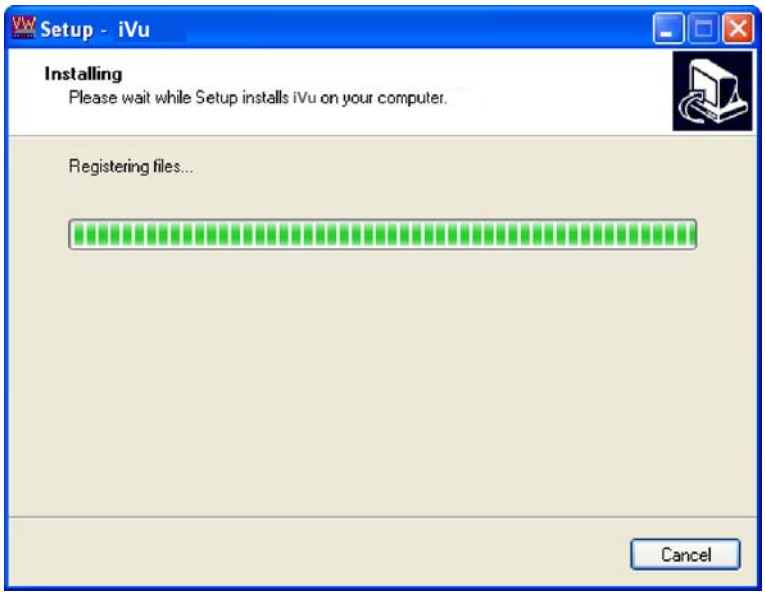


Figure 5-7: smartOSD Installing

Step 16: The **Completing the iVu Setup Wizard** window appears (Figure 5-8)

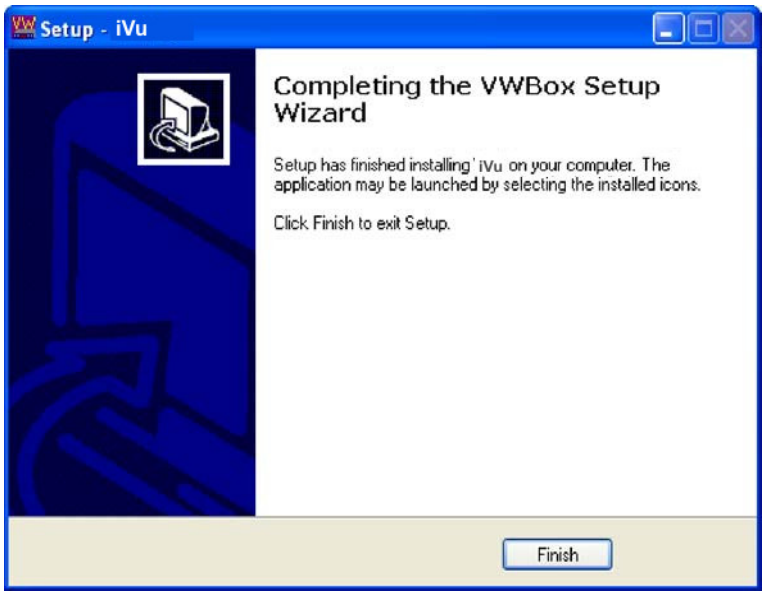

Setup - iVu
Completing the VWBox Setup Wizard
Setup has finished installing iVu on your computer. The application may be launched by selecting the installed icons.
Click Finish to exit Setup.
Finish

Figure 5-8: smartOSD Installation Complete

Step 17: Click **FINISH** to close the installation wizard.

5.1.3 Using the smartOSD

The table below shows the smartOSD menu structure (Table 5-1).

Menu	Options
Interface	Interface Selection
Display	Display Resolution Display Mode Mask Setting
Setting	Digital I/O Test Input Source Power Factory Reset OSD Lock OSD Rotation
About	Company Contact Details

Table 5-1: smartOSD Menu Structure

5.1.3.1 Control Panel

The control panel page presents all the adjustable settings for the iVu4/9.

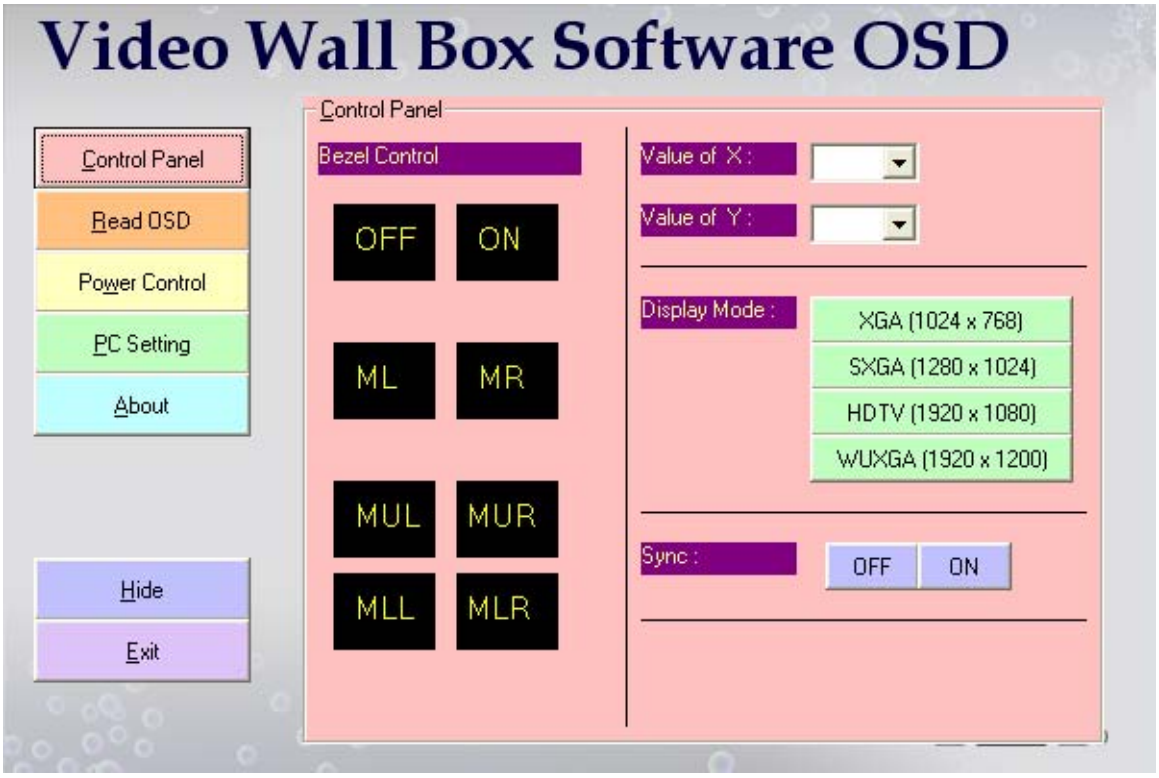


Figure 5-9: smartOSD Control Panel

➔ **Bezel Control**

The Bezel Control options allow the images to be adjusted to compensate for the gaps between monitors in the video array.

➔ **Off** The images are shown without any adjustments

➔ **On** The value of X and the value of Y can be adjusted to compensate for gaps between monitors (for single video box)

➔ **ML** The left side is fixed and the right side changes when adjustments are made (for left side video box in a two video box setup)

- ➔ **MR** The right side is fixed and the left side changes when adjustments are made (for right side video box in a two video box setup)
- ➔ **MUL** The upper left corner is fixed and the lower right corner position changes when adjustments are made (for top left video box in a four video box setup)
- ➔ **MUR** The upper right corner is fixed and the lower left corner position changes when adjustments are made (for top right video box in a four video box setup)
- ➔ **MLL** The lower left corner is fixed and the upper right corner position changes when adjustments are made (for lower left video box in a four video box setup)
- ➔ **MLR** The lower right corner is fixed and the upper left corner position changes when adjustments are made (for lower right video box in a four video box setup)

➔ **Value of X**

The **Value of X** sets the horizontal bezel compensation. Use the formula in Figure 4-9 to calculate the correct setting.

➔ **Value of Y**

The **Value of Y** sets the horizontal bezel compensation. Use the formula in Figure 4-9 to calculate the correct setting.

➔ **Display Mode**

The Display Mode option sets the video output resolution.

- ➔ **XGA** Output resolution is set to 1024 x 768
- ➔ **SXGA** Output resolution is set to 1280 x 1024
- ➔ **HDTV** Output resolution is set to 1920 x 1080
- ➔ **WUXGA** Output resolution is set to 1920 x 1200

➔ **Sync**

The Sync option sets the syncing between multiple video boxes.

➔ **On** Video boxes are set to synchronize with each other

➔ **Off** Video boxes are not set to synchronize with each other

5.1.3.2 Read OSD

The Read OSD menu displays the settings of the video wall box.

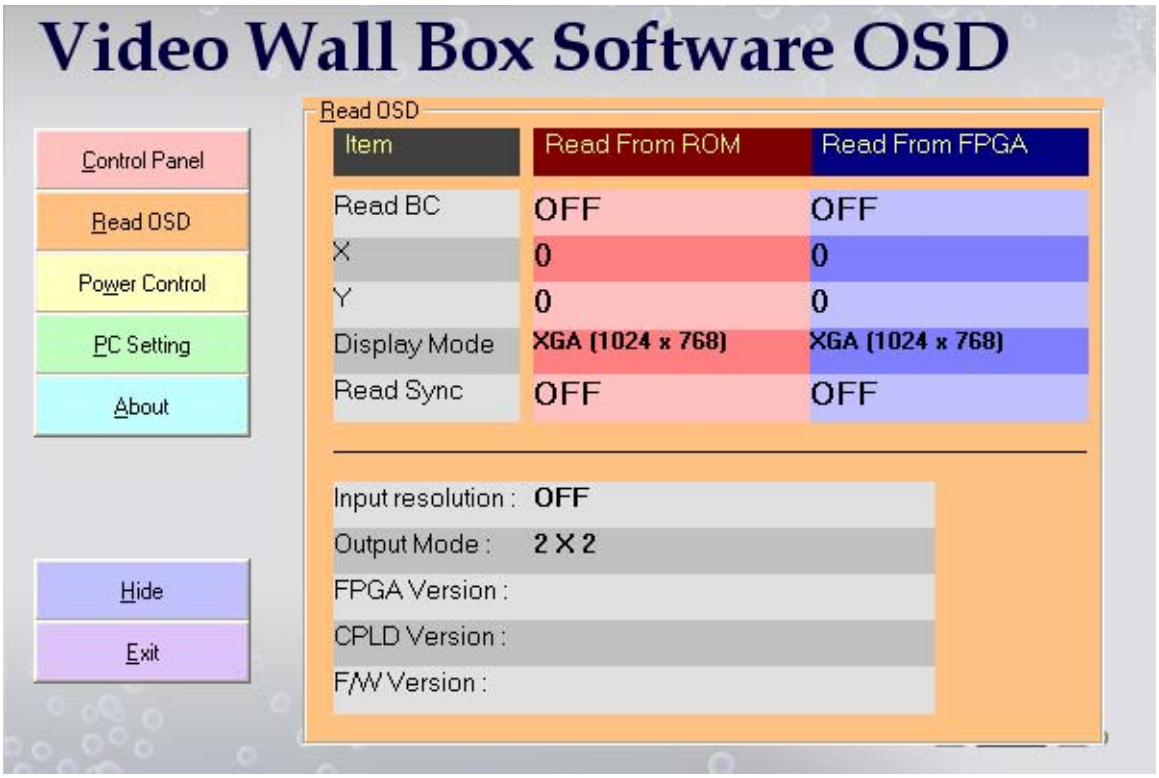


Figure 5-10: smartOSD Read OSD

5.1.3.3 Power Control

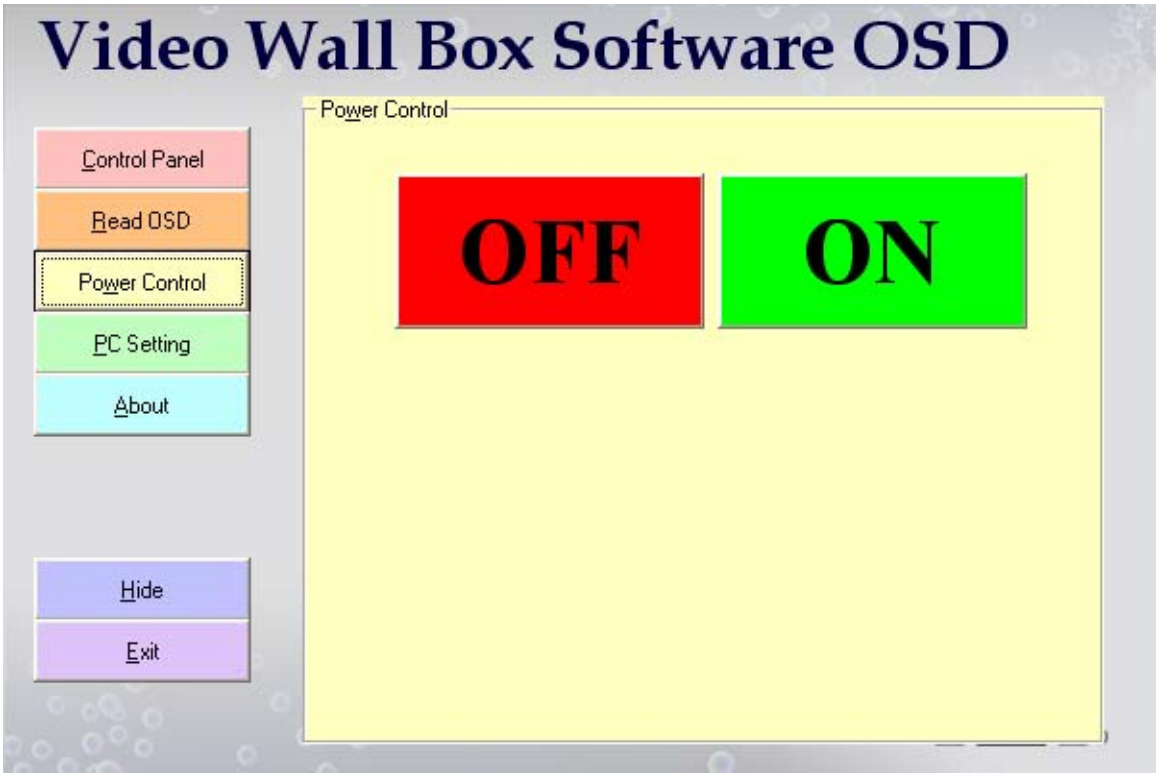


Figure 5-11: smartOSD Power Control

➔ **Power Control**

The Power Control option turns the iVu4/9 on and off.

➔ **On** Turns on the video box

➔ **Off** Turns off the video box

5.1.3.4 PC Setting

The PC Setting page sets the command port to use for data communication between the video box and the computer.

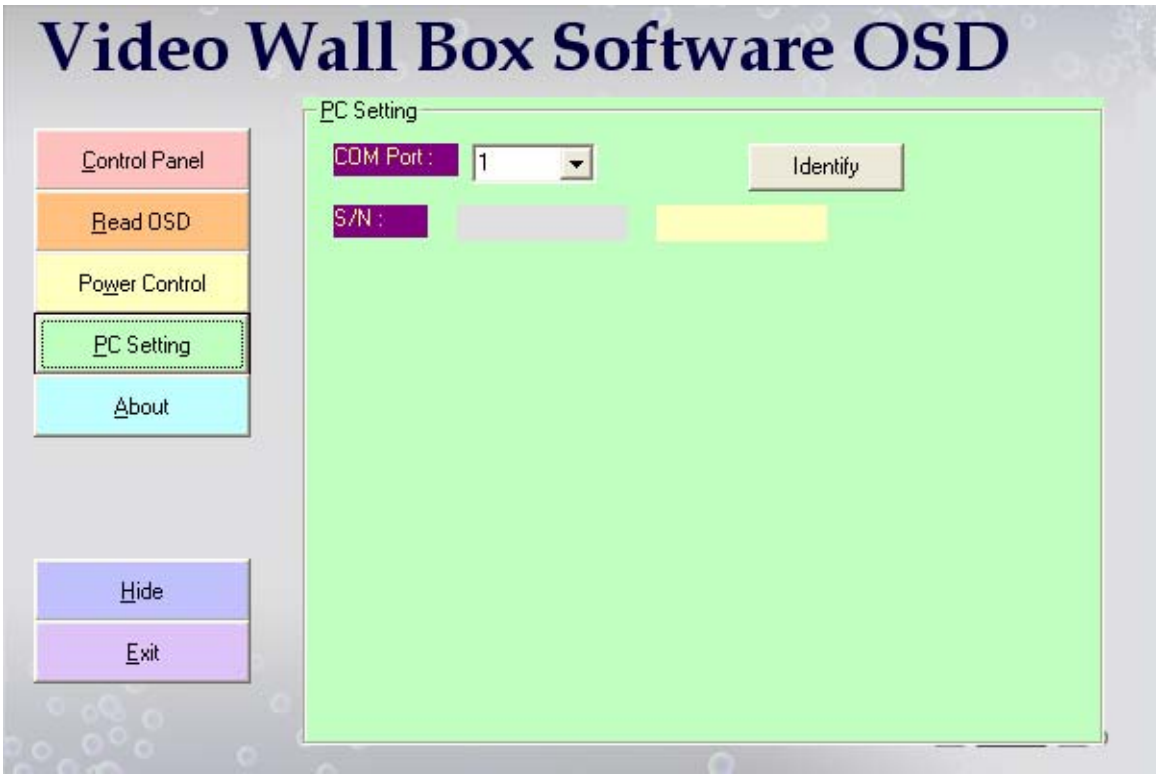


Figure 5-12: smartOSD PC Setting

➔ **COM Port**

The COM Port sets which serial port to use for data communication with the video box. The available serial ports depend on the system.

➔ **Identify**

The Identify button shows a red square for each full image in the array.

- ➔ **Clone Mode** Four red squares are displayed
- ➔ **Split Mode** Two red squares are displayed
- ➔ **Video Wall** One red square is displayed

5.1.3.5 About Page

The About Page shows some general information about the smartOSD.

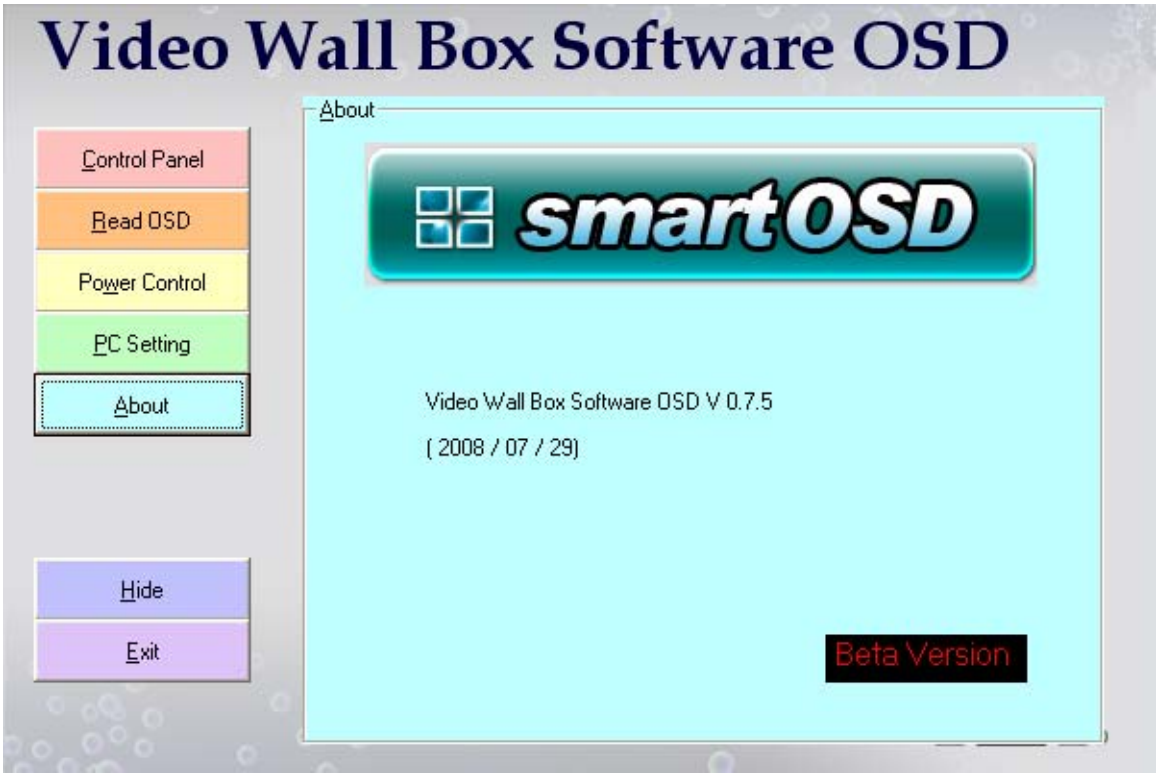


Figure 5-13: smartOSD About Page

5.2 Using the OSD

The OSD menu functions are described below.

5.2.1 OSD Buttons

There are several on-screen-display (OSD) control buttons oriented either vertically on the right side of the monitor front panel or on the bottom of the monitor front panel. **Figure 5-14** shows a typical arrangement of OSD controls.

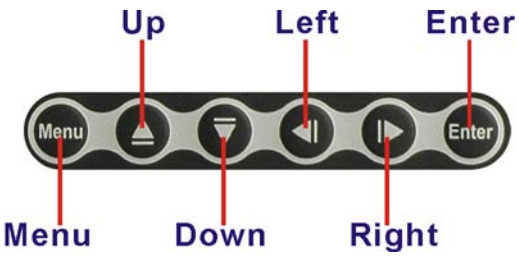


Figure 5-14: OSD Buttons

- **Menu/Enter**. Enters the OSD, selects items and sets the new values entered.
- **Left**. Moves the selection left.
- **Right**. Moves the selection right.
- **Up**. Moves the selection up.
- **Down**. Moves the selection down.
- **Auto/Exit**. Exits from any menu.

5.2.2 OSD Lock

The OSD front panel buttons can be locked using the OSD lock function. To turn the OSD lock on and off, follow the steps below. (The OSD can also be locked using the smartOSD).

Step 1: Push the "**Right**" and "**Auto/Exit**" buttons simultaneously for a few seconds.

Step 2: The OSD display shows the current status as locked or unlocked.

5.2.3 OSD Menu

The subsections below cover the layout and use of the OSD. The table below shows the OSD menu structure.

Menu	Options	Description
Bezel control	BC	Turns bezel on and off
	X	Sets horizontal bezel value
	Y	Sets vertical bezel value
Input resolution	INX	Displays horizontal input resolution
	INY	Displays vertical input resolution
	MD	Displays the video display mode
Output resolution	DS	Displays output setting
	H	Displays output horizontal resolution
	V	Displays output vertical resolution
Synchronization	SYN	Turns synchronization on and off
	PWR	Turns off the video box
Input selection	FP	Displays the video chip revision number
	CP	Displays the video chip revision number
	FW	Displays the firmware revision number
Model information	Name	Displays the model name
	SN	Displays the serial number

Table 5-2: OSD Menu Structure

5.2.3.1 Bezel Control

The bezel control options are shown in **Figure 5-15** and described below.

Figure 5-15: Bezel Control

➔ **BC**

BC enables and disables bezel control. Bezel control adjusts the onscreen image to compensate for the gaps between monitors in the video wall array.

➔ **Off**	**DEFAULT**	Onscreen image is not adjusted
➔ **On**		Onscreen image is adjusted

➔ **X**

X sets how much the horizontal resolution of the image is adjusted to compensate for the gaps between the monitors. Use the formula in Figure 4-9 to calculate the value of X.

➔ **Y**

Y sets how much the horizontal resolution of the image is adjusted to compensate for the gaps between the monitors. Use the formula in Figure 4-9 to calculate the value of Y.

5.2.3.2 Input Resolution

The input resolution menu displays the input resolution and the automatically selected video mode.

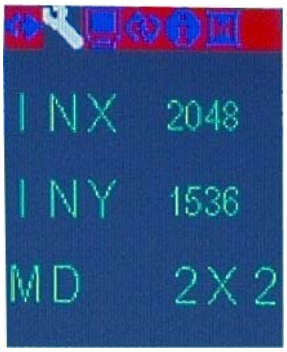


Figure 5-16: Input Resolution

➔ **INX**

Displays the horizontal resolution of the video input signal. The following values are permissible.

- 1920
- 2048
- 2560
- 3840

➔ **INY**

Displays the vertical resolution of the video input signal. The following values are permissible.

- 768
- 1024
- 1080
- 1200
- 1536
- 2048
- 2400

➔ **MD**

Displays the automatically selected video display mode.

- ➔ **1 x 1** The full image is displayed on all the monitors.
- ➔ **2 x 1** The full image is displayed on each row of the video wall array
- ➔ **2 x 2** The full image is displayed across the entire array with each monitor showing a portion of the full image

5.2.3.3 Output Resolution

The output resolution menu displays the resolution of the video output.

Figure 5-17: Display Menu

➔ **DS**

DS displays the name of the output resolution. Permissible values are:

- XGA
- SXGA
- HDTV
- WUXGA

➔ **H**

H displays the horizontal resolution of the video output. Permissible values are:

- 1024

- 1280
- 1920

➔ **V**

V displays the vertical resolution of the video output. Permissible values are:

- 768
- 1024
- 1080
- 1200

5.2.3.4 Synchronization

The **Synchronization** menu sets the synchronization between video wall boxes in a multiple video box setup.

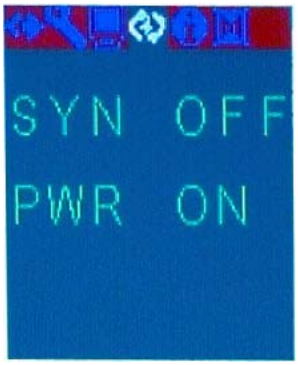


Figure 5-18: Synchronization

➔ **SYN**

Turns synchronization on and off.

➔ **On** The video boxes are connected with a cable and the displayed images are synchronized.

➔ **Off** The video boxes display output in the default fashion.

➔ **PWR**

Turns the video box on and off

➔ **On** The video box is powered on

➔ **Off** The video box is powered off

5.2.3.5 Hardware Information

The **Hardware Information** menu shows the hardware information of the video box.

Figure 5-19: Hardware Information

➔ **FP**

FP displays the firmware version of the onboard chip.

➔ **CP**

CP displays the firmware version of the onboard chip.

➔ **FW**

FW shows the version number of the video box firmware.

5.2.3.6 Model Information

The **Model Information** menu shows the model name and the serial number of the video box.

Figure 5-20: Input Select

➔ **Model Name**

The first line displays the model name of the current video box.

➔ **SN**

SN displays the serial number of the video box.

5.2.4 Remote Control

The iVu4/9 comes with a remote control for easy configuration of OSD settings.
Figure 5-21 shows the remote control and its function keys.

Figure 5-21: Remote Control

- **Power**. Turns the video box on and off.
- **Menu**. Enters the OSD, selects items and sets the new values entered.
- **Left**. Moves the selection left.
- **Right**. Moves the selection right.
- **Up**. Moves the selection up.
- **Down**. Moves the selection down.
- **Auto/Enter**. Exits from any menu.

Chapter

6

Troubleshooting and Maintenance

WARNING:

Take Anti-Static precautions whenever maintenance is being carried out on the embedded system components. Failure to take anti-static precautions can cause permanent embedded system damage.

6.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the iVu4/9 may result in permanent damage to the iVu4/9 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the iVu4/9. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the iVu4/9, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***: - Before handling the board or opening the embedded system, touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: - When configuring the iVu4/9, place it on an antic-static pad. This reduces the possibility of ESD damaging the iVu4/9.
- ***Only handle the edges of the PCB***: - When handling the PCB, hold the PCB by the edges.

6.2 Maintenance Overview

NOTE:

There are no user-serviceable parts inside. Make sure to carefully follow all the instructions in this section to diagnose any problems. If the problem persists, email sales@ems-imaging.com for help from an EMS sales representative

To preserve the working integrity of the iVu4/9 embedded system, the embedded system must be properly maintained. If embedded system components need replacement, the proper maintenance procedures must be followed to ensure the embedded system can continue to operate normally.

6.3 Troubleshooting

This section provides some simple troubleshooting suggestions.

6.3.1 No Image on One Monitor

If there is no image on one monitor, follow these steps to remedy the problem.

6.3.1.1 Check Monitor Power

Step 1: Check that the monitor is turned on.

Step 2: Check that the power source for the monitor is turned on.

Step 3: Check that the power source has the correct power rating (check panel specifications for details).

Step 4: Make sure the LCD panel power cables are securely fastened to the monitor and to the power source.

6.3.1.2 Check Panel Video Connection

Check to see that the video cable is fitted correctly.

Step 1: Check that the monitor is connected to the iVu4/9.

Step 2: Securely attach the video cable to the panel and to the iVu4/9.

Step 3: Fasten the video cable at both ends and tighten the video cable screws.

6.3.2 No Image Two or Three Monitors

If there is no image on more than one of the panels, then repeat the steps in **Section 6.3.1** for all of the monitors in the array.

6.3.3 No Image on Any Monitor

If no image displays on any monitors, repeat the steps in **Section 6.3.1** for all the monitors in the array, then try the following additional steps.

6.3.3.1 Check Video Box Power

Make sure that the video box is powered on.

Step 1: Check the power supply is connected to the power source.

Step 2: Check that the iVu4/9 is connected to the power supply.

6.3.3.2 Check Source Video Connection

Check to that the source video cable is securely connected to the iVu4/9.

Step 1: Securely attach the video cable from the video source to the iVu4/9.

Step 2: Fasten the video cable at both ends and tighten the video cable screws.

Appendix

A

RS-232 Setup

A.1 Setup

The serial port is used to remotely set and get the settings from the iVu4/9. The serial port is used by user applications to change the settings of the iVu4/9 through a software interface. The serial port should be setup as indicated in Table 6-1

Description	Setting
Baud rate	115200
Parity	Non-parity
Data bit	8
Stop bit	1
Flow control	None

Table 6-1: RS-232 Setup

A.2 Packet Format

The generalized format of a single data packet on the RS-232 communications port is shown in Table 6-2. The specific setup details for all the commands are shown in the next section.

Byte	Function
[1]	The number of bytes in the signal
[2]	This byte indicates the command to perform
[3]-[n-1]*	These bytes contain the data needed for the command
[n]*	Checksum byte

Table 6-2: n-Byte Data Output Format

* n indicates the number of bytes (length) of the data packet. This value depends on the command that is being used.

A.3 Command Reference

This section details the commands that can be sent over the RS-232 communications port.

The following commands are detailed:

- Get display status 58
- Get factory defaults 59
- Set mask control 60
- Set display mode 61
- Set display resolution 61
- Set input source 62
- Set power control 62
- Set to default 63
- Set OSD mode 63

A.3.1 Get Display Status

Byte	Value
[1]	0x08
[2]	0x03
[3]	Output resolution: 0 – 1024 x 768 1 – 1360 x 768 2 – 1280 x 1024 3 – 1400 x 1500 4 – 1680 x 1050 5 – 1600 x 1200 6 – 1920 x 1200
[4]	Output display mode 0 – 1 x 1 mode 1 – 1 x 2 mode 2 – 2 x 2 mode 3 – PIP mode 1 4 – PIP mode 2 5 – PIP mode 3 6 – PIP mode 4
[5]	Mask control 0 – Off 1 – On
[6]	Horizontal mask percent 0 – 10%
[7]	Vertical mask percent 0 – 10%
[8]	Checksum 0xff-([1]+[2]+[3]+[4]+[5]+[6]+[7]+[9])

Table 6-3: Get Display Status

A.3.2 Get Factory Defaults

Byte	Value
[1]	0x09
[2]	0x04
[3]	Input source 0 – VGA 1 – YpbPr 2 - DVI
[4]	Power 0 – Power off 1 – Power on
[5]	OSD lock/unlock 0: OSD unlock 1: OSD lock
[6]	OSD orientation 0 – Normal 1 – 90º counterclockwise
[7]	GPI status bits 1 – 4
[8]	GPO status bits 1 – 4
[9]	Checksum 0xff-([1]+[2]+[3]+[4]+[5]+[6]+[7]+[8]+[9])

Table 6-4: Get Factory Defaults

A.3.3 Set Mask Control

Byte	Value
[1]	0x07
[2]	0x18
[3]	Display mode 0 – 1 x 1 mode 1 – 1 x 2 mode 2 – 2 x 2 mode 3 – PIP mode 1 4 – PIP mode 2 5 – PIP mode 3 6 – PIP mode 4
[4]	Horizontal mask percent 0 – 10%
[5]	Vertical mask percent 0 – 10%
[6]	Mask control 0 – Off 1 – On
[7]	0xff-([1]+[2]+[3]+[4]+[5]+[6])

Table 6-5: Set Mask Control

A.3.4 Set Display Mode

Byte	Value
[1]	0x04
[2]	0x19
[3]	Display mode 0 – 1 x 1 mode 1 – 1 x 2 mode 2 – 2 x 2 mode 3 – PIP mode 1 4 – PIP mode 2 5 – PIP mode 3 6 – PIP mode 4
[4]	0xff-([1]+[2]+[3])

Table 6-6: Set Display Mode

A.3.5 Set Display Resolution

Byte	Value
[1]	0x04
[2]	0x1A
[3]	Output resolution 0 – 1024 x 768 1 – 1360 x 768 2 – 1280 x 1024 3 – 1400 x 1500 4 – 1680 x 1050 5 – 1600 x 1200 6 – 1920 x 1200
[4]	0xff-([1]+[2]+[3])

Table 6-7: Set Display Resolution

A.3.6 Set Input Source

Byte	Value
[1]	0x04
[2]	0x1B
[3]	Input source 0 – VGA 1 – YpbPr 2 - DVI
[4]	0xff-([1]+[2]+[3])

Table 6-8: Set Input Source

A.3.7 Set Power Control

Byte	Value
[1]	0x04
[2]	0x1C
[3]	Power control 0 – power off 1 – power on
[4]	0xff-([1]+[2]+[3])

Table 6-9: Set Power Control

A.3.8 Set to Default

Byte	Value
[1]	0x04
[2]	0x01
[3]	Defaults 0 – auto adjust 1 – factory defaults
[4]	0xff-([1]+[2]+[3])

Table 6-10: Set to Default

A.3.9 Set OSD Mode

Byte	Value
[1]	0x04
[2]	0x02
[3]	OSD Mode 0 – OSD unlock 1 – OSD lock 2 – OSD normal position 3 – OSD rotated 90º counterclockwise 4 – OSD ID information
[4]	0xff-([1]+[2]+[3]+[4])

Table 6-11: Set OSD Mode

Appendix

B

Terminology

COM	COM refers to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DB-9 connector.
DIO	The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.
DVI	The Digital Video Interface standard allows analog and digital video transmission
GPIO	General purpose input/output
LCD	Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

C

Hazardous Materials Disclosure

C.1 Hazardous Materials Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

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A label will be placed on each product to indicate the estimated “Environmentally Friendly Use Period” (EFUP). This is an estimate of the number of years that these substances would “not leak out or undergo abrupt change.” This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	X	O	O	O	O	X
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

部件名称 有毒有害物质或元素

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